Assessing the Impact of a Patient Clinical Information System (PatCIS) on the Patient-Provider Relationship

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INTRODUCTION

The widespread deployment of Internet-based information systems has afforded the possibility for patients to access their own medical records over the World Wide Web. However, there are a number of issues related to evaluating the usage and impact of such systems on the provider-patient relationship. This presentation describes an evaluation of a Web-based clinical information system developed at Columbia University, known as PatCIS, which can be accessed by patients from home to obtain health information and manage chronic diseases[1]. The system provides patients with customized views of their medical records and allows patients with chronic illnesses, such as diabetes and asthma, to enter their health data and receive advice about their illness. A multimethod approach was used for the evaluation. The objective of the evaluation was not only to assess the usage and usability of the system but also to determine how the system affected the patient-provider interaction.

BACKGROUND AND METHODS

The effects of changes being brought about by emerging technology, such as Internet-based information resources for patients, must be considered in relation to patient understanding and provider therapeutic goals. To develop individualized, context-sensitive information that will end up being applied by patients, we must be able to evaluate how that information is understood, who is trying to understand it, and what problems occur in its comprehension and application. Over the past decade, we have been involved in cognitive studies of reasoning and comprehension of medical information by both lay people and health care professionals. More recently, we have extended our approach to the evaluation of PatCIS.

The evaluation included collection and analysis of several types of data: (1) log files of system use over the duration of the study, (2) periodic presentation of online questionnaires to patient users, (3) semistructured interviews with both patient users and their physicians, and (4) usability testing. From our prior evaluations, we have found that although individual methods alone can provide valuable information, to gain indepth understanding underlying use of systems by both patients and physicians, complementary methods are required[2].

RESULTS AND FINDINGS

Data were collected and analyzed from the interactions of 10 patient subjects who were followed over time as they interacted with PatCIS. The patients were recruited from private practices of internists at New York Presbyterian Hospital. The first patient session was in April 1999, the pilot phase was continued through the end of February 2000, and the current and final phase is ongoing. Analysis of automatic logging of all user interactions to date indicates that the most frequently used function was the review of laboratory data, which were accessed at least once in 71 percent of the sessions. Users selected this function 270 times and examined details 340 times. "Reports" was the next most often used function (40 times). Patients selected a variety of report headers, including radiology, cardiology, and pathology.

In summary, analysis of logs indicates that the features most used by patients were

review of laboratory data and reports; data entry, educational links, and advice were used more sparingly.

Questionnaires were e-mailed to all PatCIS users after 6 months of system use. The results, which were consistent with the usage data, indicate that patients found the review of laboratory data to be the most useful function. Specific usability problems related to display of graphs and access to outside sources of information were mentioned by a few users.

To assess the impact of the use of PatCIS on the doctor-patient interaction, users were presented with online questionnaires (at periodic intervals), and semistructured phone interviews were conducted with both the patient subjects and their providers. The interviews were audiotaped, transcribed, and analyzed for their content using qualitative methods. The objective was to obtain information about how useful patients perceived PatCIS to be, what features they used, and whether they perceived that use of the system had affected their relationship with providers and decisionmaking. Participating physicians were also interviewed to assess whether PatCIS had affected interaction with their patients who were using the system.

The results indicated that subjects, both patients and physicians, found that use of PatCIS had a direct impact on communication between patient and physician, by allowing patients to closely monitor daily changes in their own conditions. For patients, this was seen as resulting from the ability to view and follow their lab results over time, which is consistent with the results from the analysis of the logged data described above. Subjects indicated that they were able to more closely follow their lab values at home (using PatCIS) and were able to discuss their conditions at a more detailed level during doctor-patient interviews, which in turn helped them in understanding and managing their

conditions. Regarding changes in doctor-patient interaction, one subject stated that "Communication is less in the way of getting information now, and more in the way of discussing treatment options and agreeing on a course of actions, so to me it's more efficient than the old way."

This perception of the system as providing a mechanism for keeping patients up to date about changes in their conditions (thereby improving the level of communication during the limited time available during doctor-patient interviews) was mirrored by the comments of the physicians. For example, one physician, when asked whether he was aware that his patients used PatCIS, stated, "Oh yes, all of the time, because they e-mail me their concerns about labs . . ." This same physician also indicated that the level of questions asked by patients had risen since patients had a chance to view their data before the doctor-patient interview. The analysis of the initial baseline questionnaire presented to users (on first login) indicated an overall high level of education, which would have fostered an improved understanding and awareness of their conditions.

Results also indicated that some subjects (both patients and physicians) were not aware of the full functionality of PatCIS. In general, it would appear that more extensive training on use of the system would be desirable and that lack of detailed knowledge of system capabilities may have been the reason for the differential use of system functions (as described above) regarding analysis of all logged interactions.

Other areas for improvement that emerged from the interviews, as well as from the usability questionnaire, included identification of difficulties encountered by a few subjects in viewing graphs. In addition, one subject stated that he encountered difficulties in using links to outside educational resources (i.e., the links did not lead to the desired sites). We

are currently looking into these usability issues as input into the iterative refinement of the system.

To date, none of the patient subjects or participating physicians have indicated any adverse effect of the use of PatCIS.

DISCUSSION AND CURRENT WORK
In summary, findings have indicated that systems such as PatCIS can have a positive impact on patient-provider interaction by providing patients with the ability to monitor their own conditions. Specifically, top-level findings emerging from the evaluation and analysis of data collected to date include the following:

- Both patients and physicians indicated that the use of PatCIS had improved the level and content of communication (both during doctor-patient interviews and during subsequent electronic communication).
- Patients indicated that review of their own data was an extremely useful function and allowed them to keep up to date on their conditions and obtain information about their conditions that they could follow up on with their physicians (regarding interpretation and implications for treatment/therapy).
- Low usage of certain PatCIS functions may be due to lack of subject knowledge about PatCIS functionality, indicative of the need for additional training to more fully familiarize patients with system features.

The evaluation of PatCIS is currently in its final phase, and additional interviews are being conducted with both patients and their physicians. In addition, we are currently conducting indepth, laboratory-based usability testing[3] with several patients.

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